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An analysis of the bulk petroleum logistic system.

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AN ANALYSIS OF THE BULK PETROLEUM LOGISTIC SYSTEM

RICHARD BOND WAMPLER

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OF THE

BULK PETROLEUM LOGISTIC SYSTEM

by

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Lieutenant Commander, Supply Corps, United States Navy

Submitted in partial fulfillment of
the requirements for the degree of

MASTER OF SCIENCE

IN

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ABSTRACT

There is probably no single commodity more vital than petroleum to the conduct of military operations and to the industrial economy that must support it. Although there was a single manager established for Petroleum Logistic Support, certain responsibilities remained with the individual Services. Because of its vital nature and the resource constraints placed on the Department of Defense, it is imperative that the Petroleum Logistic System be the most dependable, responsive, and economical system possible. Does the present-day modified single manager plan meet these criteria? If fully integrated, would the system provide additional economies?

The author arrives at the conclusion that the current system is dependable and responsive. Further, that economies to be gained under the single manager concept are being reaped from the modified plan in operation today.

This writer wishes to express his appreciation for the assistance and encouragement given to him by Commander Sherman W. Blandin, Supply Corps, U. S. Navy of the U. S. Naval Postgraduate School in this research paper.

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INTRODUCTION

On 19 January 1948, James Forrestal, then Secretary of Defense, made the following statement before the Special Subcommittee on Petroleum of the Armed Services Committee of the House of Representatives: "There was a time when the major item of supply to a fighting force was food, as Napoleon graphically pointed out when he said that an army marches on its stomach. In World War II, however, the volume of liquid fuel shipped overseas was nearly 16 times that of food. Petroleum and petroleum products amounted to over 60 percent of the overseas military shipments."[1] The changing emphasis on petroleum and its products during World War II is further reflected in two statements by Admiral Chester Nimitz. At the beginning of the war he said that winning the war was a matter of "beans, bullets, and oil". Before the end of the war he revised his statement and said, "Now it's oil, bullets, and beans."[2]

It is estimated that in the later months of 1951, petroleum comprised as much as 62 percent of the total tonnage required for the support of the United Nations forces in Korea.[3] Even the advent of fissionable energy sources and global ballistic missiles in the military has not decreased the ever-growing demands for petroleum. Military-planned procurement in 1965 is expected to increase approximately 17,000,000 barrels over

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[1]Bureau of Naval Personnel, Fundamentals of Petroleum, NAVPERS 10883, Department of the Navy, 1953, p. 1.

[2]Bureau of Naval Personnel, Petroleum Logistics, NAVPERS 10892, Department of the Navy, 1955, p. 7.

[3]Fundamentals of Petroleum, op. cit., p. 1.

the requirements for Fiscal Year 1961.[4] During 1961, deliveries were at a high of 722,000 barrels per day as compared with peak mobilization consumption during World War II of over 1,000,000 barrels per day.[5]

Impressive as these facts appear, of greater significance is the staggering petroleum requirements in the event of another war. Speaking before the Canada-United States Permanent Joint Board on Defense in August 1948, Captain J. M. Boyd, USN, said, "All of the probable military requirements for petroleum products, when added together, will be in the vicinity of 9 to 10 million barrels per day."[6] With the increasing requirements of aviation fuels required by the high performance aircraft today, bigger carriers (powered by black oil), and bigger and faster destroyer-type ships, the estimate of Captain Boyd may well be low. Considered alternatively, the utilization of fissionable energy may gain momentum with developments of economical and practical means of applying this source of power on a much wider scale, thereby decreasing bulk petroleum requirements. Until such sources of power are avialable, however, petroleum will retain its vital importance in over-all logistic support. Thus petroleum in modern warfare is an indispensable material which is used in tremendous quantities. There is probably no single

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[4]Clyde La Mottee, "Military Fuel Demand is Going Up Again", The Oil and Gas Journal, October 30, 1961, pp. 99-101.

[5]Petroleum Logistics, op. cit., p. 7.

[6]Ibid., p. 8.

commodity more vital to the conduct of military operations and to the industrial economy that must support it. Significant to this statement, was the confession of Admiral Togoda (Chief, Naval Combined Forces, Japan) who stated that "Japanese loss of tankers and oil resources precluded further large scale Naval operations against the United States in 1945."[7]

From this discussion emerges the fact that a primary factor in the development of our military defense system is economics--economics which deals with the allocation of scarce resources. We must seek to improve our national defense by the means of increasing the effectiveness of this allocation.

The approach of this paper is to give broad coverage to the basic elements of military petroleum logistics--primarily bulk petroleum, Navy oriented. Included are the various organizations concerned with petroleum, historical highlights of the petroleum logistics system, and an analysis of that system today.

The military essentiality of petroleum is absolute with little opportunity for substitution. Because of its vital importance, the limited resource constraints, and the extremely high expenditure of funds for military petroleum requirements, it is mandatory for the Department of Defense to provide the most dependable, responsive, and economical petroleum logistic system possible.

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[7] Petroleum Logistics, op. cit., p. 8.

CHAPTER I

MILITARY ORGANIZATION FOR PETROLEUM

General.

The special position petroleum occupies in the planning and execution of military operations requires the closest attention and coordination at all levels of government. Excessive and sporadic demands during emergencies, with limited resources available, make it imperative that a responsive control system be provided to fill priority needs of the Services. In order to insure an integrated approach to the distribution of petroleum resources, many agencies are closely interwoven to this end with the Secretary of Interior being the focal point for the numerous petroleum matters of concern to the government. Chart 1, page 5, depicts the principal government agencies concerned directly with petroleum. However, this discussion will be directed primarily to the Department of Defense (DOD) petroleum organization and those responsibilities pertaining to petroleum logistics in the Navy. Chart 2, page 6, portrays the DOD organization.

Petroleum is different.

One might ask why so many offices and agencies are concerned with petroleum; also, what makes it different from other commodities. First, it is one of the few commodities that is absolutely essential to both military operations and to the industrial activities that must go on uninterrupted in support of the Armed Forces. Second, the sources are world-wide. Hence, the political and ecomonic climates of various unrelated geographical locations have profound effects on markets and availability of the product. Third, the enormous rate of military con-

CHART I

U.S. GOVERNMENT PETROLEUM ORGANIZATION

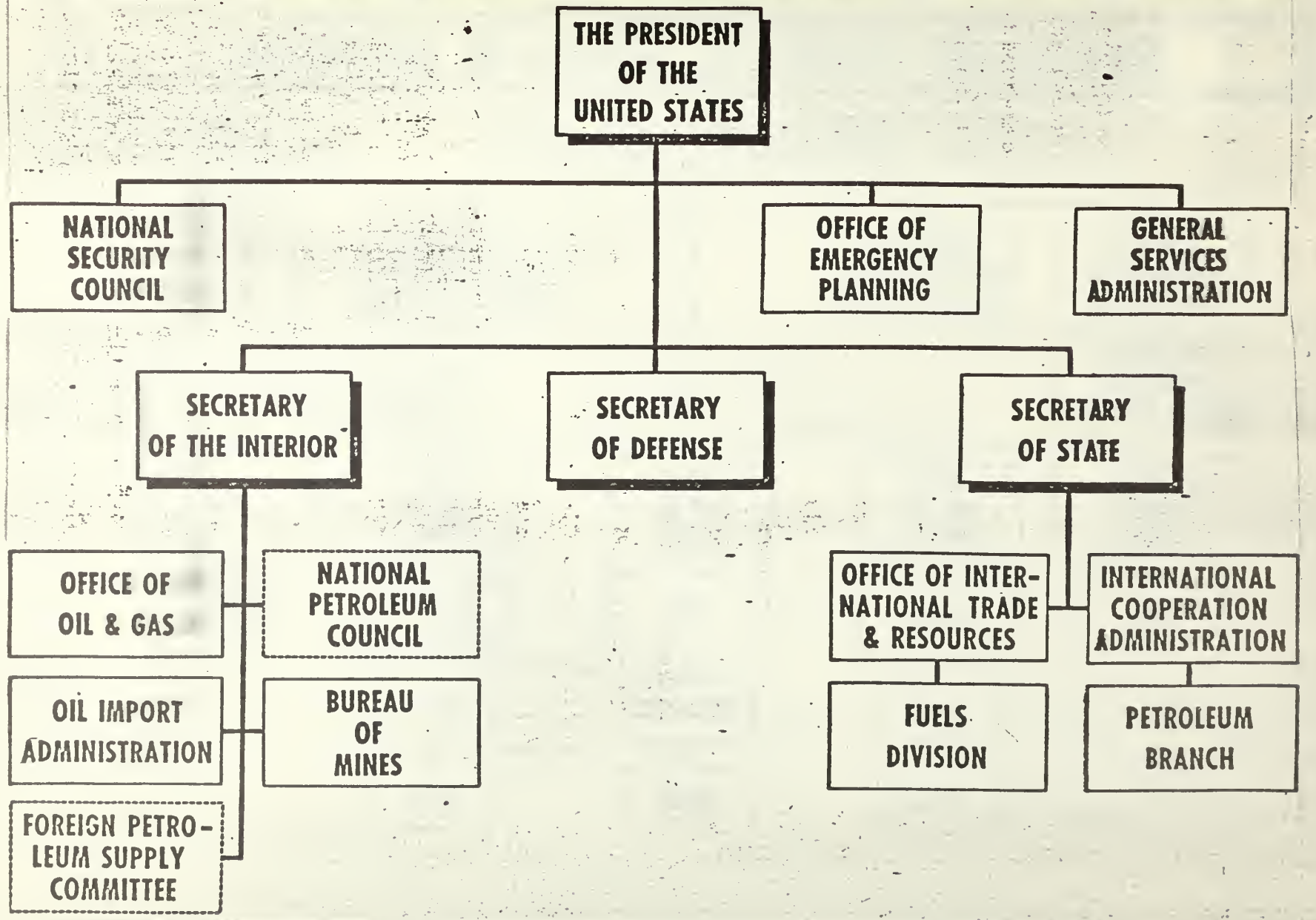
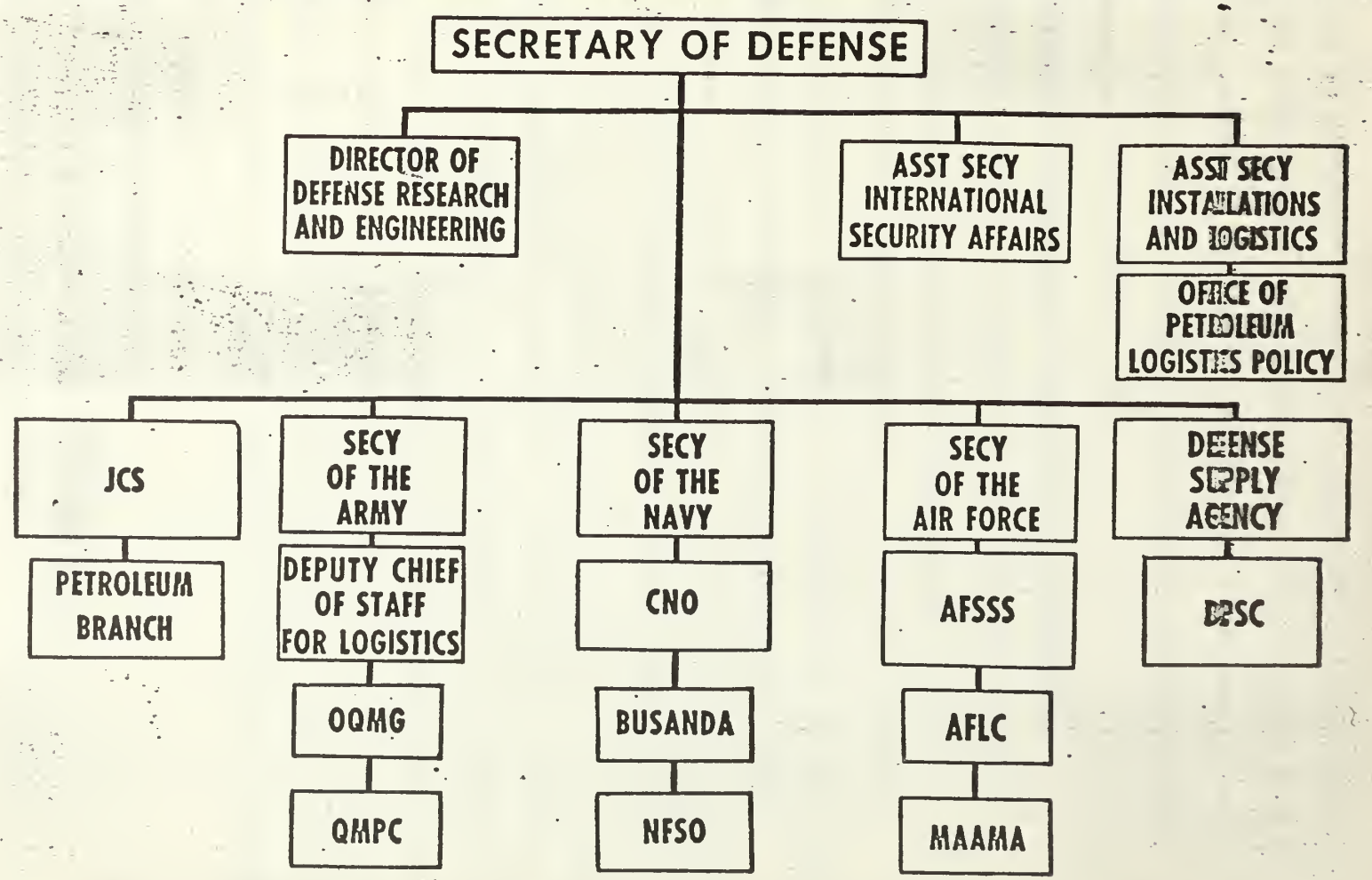


CHART II

DEPARTMENT OF DEFENSE PETROLEUM ORGANIZATION



sumption makes it impossible to store but a fraction of our wartime, or even peacetime, requirements. For these reasons, petroleum has been singled out ever since World War II days, as the only commodity for specialized handling from the Joint Chiefs of Staff (JCS) level down through the departments and the overseas commands.[8]

Assistant Secretary of Defense for Installation and Logistics

The Assistant Secretary of Defense for Installation and Logistics (ASDI&L) is responsible for advising and assisting the Secretary of Defense in the establishment of effective policies and systems for efficient and economical operation of the Department of Defense (DOD) in the supply and logistics field of procurement, production, distribution, transportation, storage, cataloging, requirements, and mobilization planning. Within DOD the focal point for petroleum policy is the Office of Petroleum Logistics Policy in the Office of the Assistant Secretary of Defense. This is the only organization in the Office of the Secretary of Defense (OSD) which is concerned purely with a single commodity. This division, based on the Joint Chiefs of Staff (JCS) Strategic and Logistic Plans, forwards planning assumptions and guidance to the Department of Interior for determining the capability of industry to support war plans; and, in turn, it evaluates comments on support capability to determine if strategic plans can be supported logistically.

Joints Chiefs of Staff Organization

The function of the Joints Chiefs of Staff Organization (JCS) is basically to provide for formulation of military strategy and joint

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[8]Defense Petroleum Supply Center, Petroleum Management, HQ, DPSC, 4100.1, Handbook, p. 3.

logistic plans and assignment of logistic responsibilities to the military departments in support of such plans. All petroleum matters originating within the JCS organization and petroleum matters referred to the agency are coordinated by the JCS Logistics Plans Committee with detailed study usually being performed by a unit within the Joint Logistic Plans Group known as the Petroleum Team.

Office of Naval Petroleum and Oil Shale Reserves.

Under the cognizance of the Secretary of the Navy, there is an Office of Naval Petroleum and Oil Shale Reserves. Its function is to explore, prospect, conserve, develop, use, operate, and administer the Naval Petroleum Reserves, administer the Naval Oil Shale Reserves, and serve as the principal Department of the Navy advisory office on matters relating to crude petroleum, both domestic and foreign. The Navy is the only service having Petroleum Reserves per se (See Chapter II, Page 12).

Chief of Naval Operations.

The Chief of Naval Operations (CNO) is responsible for the logistic support of the Operating Forces of the Navy and such Navy component forces of Unified or Specified Commands, as may be assigned by higher authority. Within the CNO organization, the Deputy Chief of Naval Operations, Logistic Plans Division, has the responsibility for the following specific functions relating to petroleum:

1. Establishing Navy world-wide levels of supply and mobilization reserve stocks of the principal bulk petroleum products.

2. Establishing the optimum quantities to be maintained at specific locations.

3. Furnish advice and guidance to Bureau of Naval Personnel on the Petroleum Program of the Naval Reserve.

4. Promulgate petroleum consumption factors (except aviation fuels) for vessels and shore stations.

5. Coordinate the preparation and determination of petroleum requirements in terms of product and storage space necessary to support current and future plans.

6. Prepare broad Navy petroleum policies and plans in so far as they affect the logistic support of the Naval Establishment.

Bureau of Supplies and Accounts

The Bureau of Supplies and Accounts (BuSandA) is responsible for the procurement, funding, storage, and issue of all petroleum products required by the Navy. Prior to 1953, these functions were performed by the Bureau's Fuel Division. However, in January of 1953, a Fuel Supply Office (FSO) was established to perform the petroleum functions previously assigned to the Fuel Division. It is the responsibility of the Navy Fuel Supply Office, under the Bureau of Supplies and Accounts, to assure a proper balance between the supply and demand for petroleum products under its control. The mission of FSO relates to the three major steps in the logistic process: (1) requirements determination showing the total for each type of bulk fuel--also, where and when they are needed, (2) procurement through Defense Fuel Supply Center (DFSC), and (3) direct distribution of bulk products purchased by DFSC.[9]

In exercising inventory control, FSO establishes minimum and maximum

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[9]The DFSC organization is discussed in Chapter II.

stock levels of supply for the various items, interprets and processes stock status reports, analyzes operation data to effect replenishment of bulk stocks within continental United States, and, also, determines and initiates disposal action for excess stocks.

Navy bulk fuel terminal facilities throughout the world are financed by BuSandA and are under its management and technical control--this control being exercised by FSO. This office recommends to the Assistant Chief of the Bureau for Supply Management the fuel-facility requirements for use in current, mobilization, and logistic code planning, based on directives from CNO.

Military Sea Transportation Service.

Prior to 1949, the Navy operated and maintained its own independent transportation service at sea. With the advent of the Single Manager for Ocean Transportation in August 1949, the Military Sea Transportation Service (MSTS) has since been responsible for the sea transportation of bulk petroleum for the entire Department of Defense. The transportation function of MSTS is considered to be an integral part of the overall logistic operation within the Navy. MSTS accomplishes delivery through (1) a nucleus fleet of Navy-owned, Navy-manned oilers and Navy-owned tankers which are contract-manned and operated, and (2) industry-furnished tankers through the Voluntary Tanker Plan. The latter was developed to meet emergency situations by industry to preclude the necessity of Government seizure of tankers during periods of crisis.

CHAPTER II

HISTORICAL HIGHLIGHTS OF THE PETROLEUM LOGISTIC SYSTEM

General.

Military petroleum management has advanced through various stages of independent , competitive procurement, joint purchasing, single department purchasing assignment, and finally a modified defense single manager concept. A resume' of this development follows to show how, throughout the history of fuel procurement, the various procurement organizations have had to operate in somewhat of a different environment than other commodities in the supply field.

Prior to World War I.

Jane's "Fighting Ships" shows that in 1901, four of the eight leading naval powers (England, The United States, Japan, and Austira) were not using oil as a fuel on any ships. However, in the United States, much experimentation was underway during this period. In 1907 contracts were let for the construction of battleships 28 and 29 (The Delaware and North Dakota), which included in the specifications a paragraph that "Provision will be made for burning fuel oil in the furnaces." This marked the beginning of the real fuel oil era.[10]

Perhaps the greatest hindrance to the assured development of such equipment and eventual installation in all Naval ships was the uncertainty of the source of fuel oil supply. The oil industry was in its infancy and not much was known about how much oil the United States could produce and for how long. Even if the oil were available, another large problem

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[10] J. E. Hamilton, LT., USN, "A Short History of Naval Use of Fuel Oil", Journal of the American Society of Naval Engineers, August, 1933, p. 278

loomed on the horizon--the problem of distribution, since oil could not be obtained for naval ships in all ports of call. Thus, from the beginning of the oil era in the Navy, the Navy has encountered problems of oil supply, and the attendant distribution problems associated therewith.

Petroleum and Oil Shale Reserves.

Because of the uncertainty of the fuel oil supply and the obvious future need for oil by the Navy, it was considered necessary to withdraw certain oil bearing lands from the public domain. Through a span of years following 1912, certain lands believed to contain oil were established as reserves to insure a supply of fuel for the Navy, which was then in the process of change-over from coal to petroleum as a source of power. Charts 3 and 4 pages 13 and 14 show the location of these reserves.

Reserve No. 1 (Elk Hills) was set aside in September 1912 to ensure a supply of 500,000,000 barrels of fuel for the Navy. At this time, however, no actual discoveries of oil had been made by drilling on this land; the selection had been founded on general knowledge of geology. Subsequent exploration has proven the wisdom of choice. Because of the uncertainty as to the amount of oil Elk Hills might contain, a Reserve No. 2 (Buena Vista Hills) was created later in 1912. Both of these reserves were, and still are, located in Kern County, California. In 1914, the Secretary of the Navy asked that another reserve be established in Wyoming in order that there might be an assured supply east of the Rocky Mountains. Accordingly, Reserve No. 3 (Teapot Dome), the most famous and scandal ridden of the Navy's Petroleum Reserves, came into being near Casper, Wyoming. Following World War I, three Oil Shale Reserves (one in

NAVAL PETROLEUM AND OIL SHALE RESERVES IN CONTINENTAL UNITED STATES

LOCATION MAP

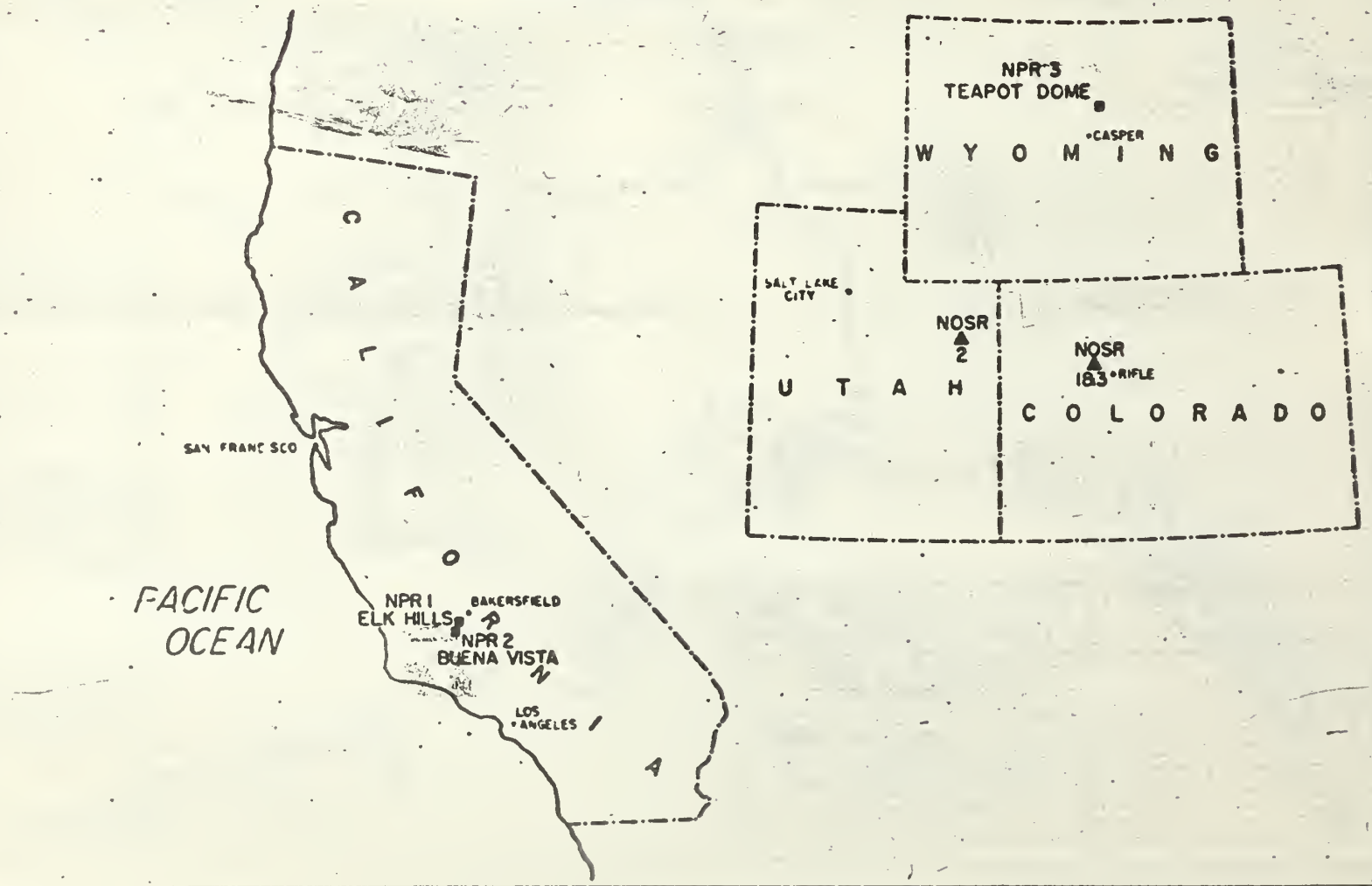
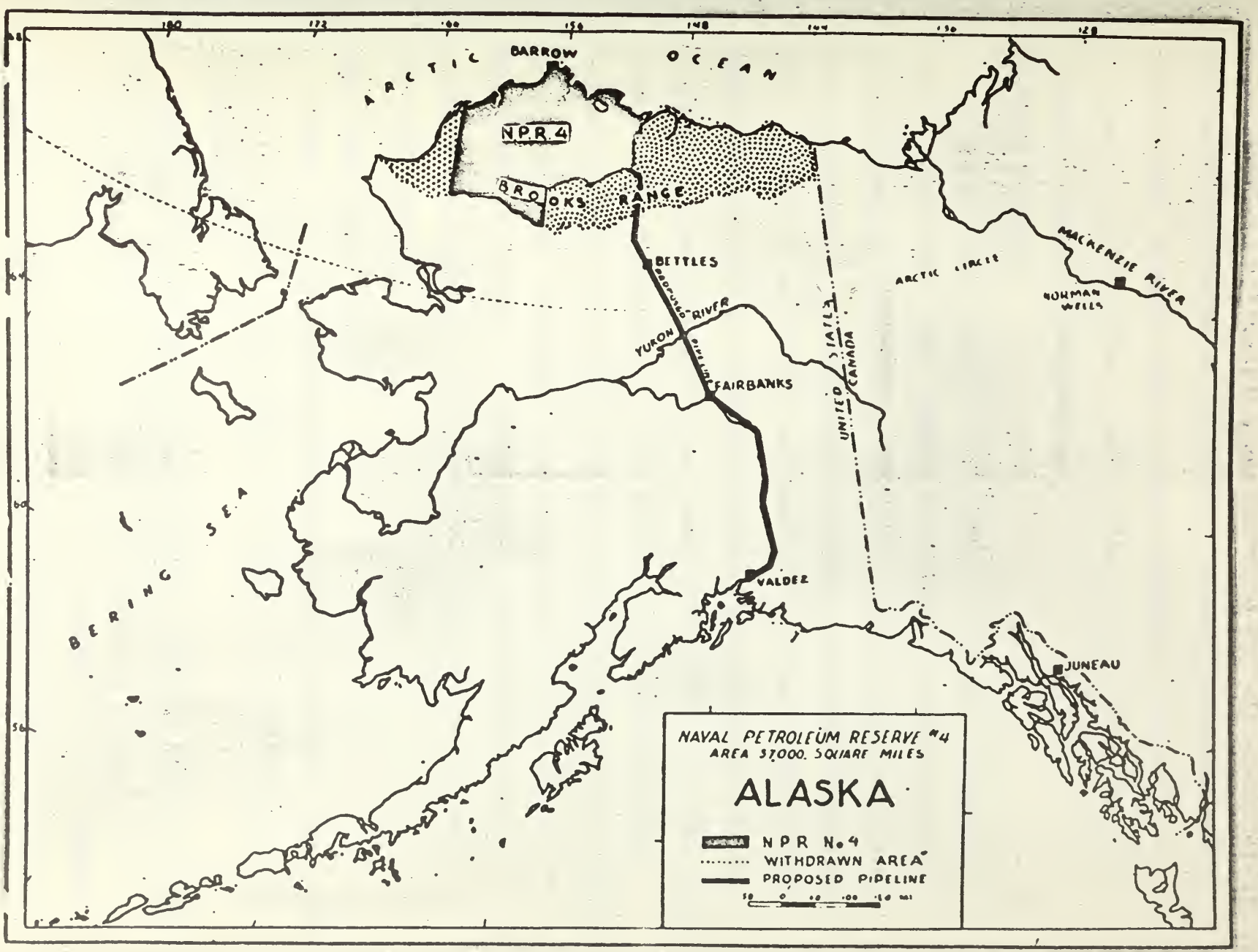


CHART IV


BARROW
ARCTIC OCEAN
NPR 4
BROOKS RANGE
BETTLES
PROPOSED PIPELINE
YUKON RIVER
FAIRBANKS
ARCTIC CIRCLE
MACKENZIE RIVER
NORMAN WELLS
UNITED STATES
CANADA
BERING SEA
VALDEZ
JUNEAU
NAVAL PETROLEUM RESERVE #4
AREA 37,000 SQUARE MILES
ALASKA
NPR No.4
WITHDRAWN AREA
PROPOSED PIPELINE

Utah and two in Colorado) and Reserve No. 4 (Alaska) were established because it was concluded, based on fuel oil usage, that the Reserves 1, 2, and 3 were inadequate. A more detailed history of these reserves is beyond the scope of this paper.

World War I to 1941.

During World War I, sufficient oil was obtained and distributed to meet the needs of the fleet. However, at that time, mechanized warfare and military aircraft took on new importance with resultant large demands for petroleum fuels. This began the independent procurement competition by the Services to obtain their requirements of petroleum. The Services established and maintained their own separate petroleum logistic systems including requirements determination, purchase responsibility, distribution, and bulk terminal operations. In the years to follow, mounting United States oil reserves and industry refinery capability were such that neither the government nor the Services were much concerned for their petroleum supply. The Navy expanded its strategically located terminals and developed a vast network of bulk terminals; and fueling-at-sea met with considerable success.

Coordinated Efforts after 1941.

Before the United States entered World War II, the need for coordinated control of petroleum became evident. A synopsis of this effort beginning in 1941 follows.

Petroleum Coordinator for National Defense. Early in 1941 the Secretary of Interior was appointed the Petroleum Coordinator for National Defense with the broad function of coordinating the government's needs. However, the Services continued to purchase their own requirements, thus placing

them in competition for products in short supply in the national economy. In December 1942, the authority of the Secretary of Interior was increased, and he was assigned the task of making "petroleum available adequately and continuously in the proper form, at the proper places, to meet military and civilian needs".[11]

Army-Navy Petroleum Board. In July 1942, the Army-Navy Petroleum Board (ANPB) was established to achieve better coordination. At the same time, Area Petroleum Officers were established on the staffs of overseas theater commanders to ensure coordinated planning and an adequate supply of product in the field.[12] The ANPB became an agency of the Joint Chiefs of Staff in 1943 and was charged with, "determining petroleum requirements for the military departments in accordance with over-all logistic plans, determining and designating for each petroleum product the appropriate service procuring agency (coordinated purchase),...."[13]

Joint Army-Navy Petroleum Purchasing Agency. In July 1945, the change was made from coordinated purchasing to joint purchasing when the Joint Army-Navy Petroleum Purchasing Agency (JANPPA) was established. Joint purchasing of petroleum products was accomplished by grouping petroleum purchasing sections of the Services into a single geographical location. Although this did not actually put a central procurement system into effect, a method of cross procurement was actually developed between the

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[11]George C. Dyer, USN (RET), Naval Logistics, (Annapolis, Maryland: United States Naval Institute, 1960), p. 201.

[12]See page 21 for more detailed discussion of Area Petroleum Offices.

[13]Dyer, op. cit., p. 201.

Services. This resulted in considerable savings--both in time and money. JANPPA and ANPB existed until the National Security Act of 1947, which eliminated the ANPB and provided for replacement of JANPPA.

Armed Services Petroleum Purchasing Agency. In February 1948, the Armed Services Petroleum Purchasing Agency (ASPPA) was established to take over the purchase function. This agency was the first jointly staffed agency to be created under the National Security Act of 1947 to perform single point procurement. It became a joint purchasing agency with the dual mission of contracting for the petroleum needs of the Services and arranging for and coordination of the distribution of all purchases. However, the inventory control function was retained by the individual Services along with the control of the distribution system.

Military Petroleum Supply Agency. The cumulation of the petroleum coordinated efforts of the military since 1941 resulted in the adoption of the single manager plan (modified) for petroleum products. Promulgated January 3, 1956, by Department of Defense Directive 5160.12, the primary objectives of the single manager plan were said to be: (1) to eliminate duplication and overlapping of effort between and among the military departments, and (2) to improve the effectiveness and economy of supply and service operations throughout the Department of Defense.[14]

These objectives, of course, were not new. They only reflected the goals of single service procurement, joint purchasing assignment, and coordinated programs. Perhaps the most distinctive feature of the single

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[14]United States Congress, House of Representatives, Committee on Government Operations, Military Supply Management, Hearings Before Subcommittee, 86th Congress, 1st Session, House Report No. 674, July 15, 1959, (Washington: Government Printing Office, 1959), p. 10.

manager plan was to vest in a single military department the responsibility for procurement, stock maintenance, and distribution of a selected commodity (common type) for all military users. Stock funds were to be used in effecting these transactions.

In consonance with the basic principles of the single manager plan, it was originally proposed that the stocks of petroleum held by the three services be transferred to a Military Petroleum Supply Agency (MPSA). The agency would perform all procurement, manage inventory stocks, and sell through the usual stock-funding arrangements to the retail level of service users. However, when the proposal was presented to the military departments, a three-way split developed.

> The Air Force opposed any change in stock ownership, its argument based on the necessity of maintaining continuous control of its war reserves of petroleum. The Army proposed to limit agency stock ownership to continental United States. The Navy proposed that the agency's stock ownership extend to certain overseas stocks.[15]

Because of the wide divergence, the decision was made to leave stock ownership in the Services without change, which happened to be the Air Force's position.

In July 1956, the MPSA was formed as the fourth original Single Manager Operating Agency.[16] MPSA was activated on 7 January 1957 as a means of improving the effectiveness and economy of petroleum supply and service operations throughout the Defense Establishment. ASPPA was then dissolved with MPSA assuming that agency's function. Operations were expanded to include new responsibilities in standardization, cataloging,

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[15] Ibid., p. 29.

[16] Ibid., p. 28.

procurement inspection, training, and war planning. However, funding, stock ownership, and inventory control were excluded. These functions remained the responsibility of the Services. Thus the MPSA charter emerged with a deviation from the single manager concept. This was said to be justified by the characteristics of petroleum and the exceptional conditions encountered in the supply and distribution of this commodity by the military departments. In December 1959, after a year of operations, a Department of Defense survey team from the Logistics System Study Project (LSSP) commented, "There is in fact no single manager for petroleum in the Department of Defense."[17] This was due to the compromise of the single manager concept.

Gradually the agency was granted more authority. In March 1960, MPSA was given full authority and responsibility to select sources of product and means of transportation to meet re-supply requirements involving tanker and tanker/barge combination movements to bulk terminals world-wide.[18] In May 1961, the Deputy Secretary of Defense directed that the scope of management by MPSA would be extended to include ownership, funding, and centralized management of wholesale stocks of Packaged Petroleum Products.[19]

Defense Fuel Supply Center. On 1 January 1962, MPSA was incorporated into the Defense Supply Agency with the new idenity of "Defense Petroleum Supply Center" being changed to "Defense Fuel Supply Center" (DFSC) on

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[17] Ibid., p. 31.

[18] Military Petroleum Supply Agency, Memorandum from the Director, File 4020, Washington, D. C., January, 1960, p. 1.

[19] Military Petroleum Supply Agency, Memorandum from the Director, 18 August 1961, p. 1.

1 February 1964. Formally, one of the seven single manager agencies established by DOD for the management of common-use items and services, its functions and operations were substantially the same as those previously assigned to MPSA. Today these principal functions are:[20]

1. Manage packaged petroleum products.
2. Conduct world-wide procurement of products.
3. Determine source of product, arrange tanker transportation, and place Army/Navy orders.
4. Contract for storage and services.
5. Direct the procurement inspection program.
6. Coordinate cataloging.
7. Coordinate interservice supply support.
8. Coordinate standardization.
9. Coordinate petroleum training.

It should be noted that in the operations of DFSC there are several significant variations from the operations of the other commodity centers under DSA. Principal variations are:[21]

1. Procurement and distribution are world-wide in scope.
2. Direct communications are authorized between DFSC and the Unified Commands.
3. DFSC does not compute net requirements and does not exercise stock financing for bulk petroleum.[22]

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[20] Petroleum Management, op. cit., p. 1.

[21] Ibid.

[22] In October 1962, DPSC assumed the management of wholesale stocks of packaged petroleum products within the United States.

Joint Petroleum Offices. Because the volume of petroleum products required in the military theaters during World War II, the Army-Navy Petroleum Board established an Area Petroelum Office in each theater to coordinate requirements, delivery, and handling. Later these offices were designated as Joint Petroleum Offices (JPO). They were established as a staff agency of the area or theater commander with staff jurisdiction over petroleum matters within the command area. Some functions are as follows:[23]

1. Coordinate logistic policy and planning in conjunction with DFSC.
2. Consolidate theater peacetime requirements and formulation of replenishment program and distribution system.
3. Coordinate the quality surveillance program within the unified command.
4. Monitor the prescribed service levels of major items to insure adequacy of stocks.

Sub Area Petroleum Offices. The Sub Area Petroleum Offices (SAPO) function as an extension of the JPO organization at a lower level within the Unified Command. While the JPO exercises staff functions, the SAPOs are concerned with the day-to-day operations. They are responsible for receipt, storage, and distribution ashore within their respective areas. Navy requirements are consolidated by the SAPO with other services in their areas for submission to the JPO. From JPO requirements for all Services are consolidated for submission to DFSC. This requirements forecast is called a "slate".

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23 Petroleum Logistics, op. cit., p. 50, p. 183.

The Monthly Bulk POL Slate is the medium by which consumption, inventory, and requirements for bulk fuels is made known to the Joint Petroleum Office and the DFSC. Although the bulk slate is not a requisition, per se, it does serve as the basic document supporting purchase action. In addition, the bulk fuel quantities indicated on the slate as "required" for each of the next five months support requests by DFSC and MSTS for tanker lifts.[24]

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[24] Ibid., p. 53.

CHAPTER III

ANALYSIS OF THE BULK PETROLEUM LOGISTIC SYSTEM

General

There are three fundamental logistical elements to any support problem. They are (1) determination of requirements, (2) procurement of these requirements, and (3) distribution of that which has been procured.[25]

The problems associated with carrying out these functions for petroleum has existed for nearly half a century. They involve the need for a dependable, responsive, and economical petroleum logistic system. Dependability and responsiveness, unquestionably, override consideration of economy during war time; however, basic theories of economies (the allocation of scarce resources) cannot be totally disregarded in either peace or war. The less resources required for support of military operations, in terms of logistics, the more resources become available for research and development, procurement of weapon systems and military hardware, and for allocation to the civilian economy. The question posed then, is how well the petroleum logistic system today meets the demands of dependability, responsiveness, and economy? To answer this, we must first look at the basic elements of logistics as they apply to petroleum. This discussion will focus primarily on bulk products.

Determination of Requirements

The Defense Fuel Supply Center (DFSC) does not compute net requirements for bulk petroleum. This responsibility remains with the individaul Service. Consequently, the Chief of Naval Operations, based on approved

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[25] Dyer, op. cit., p. 15.

Joint Chiefs of Staff (JCS) Strategic and Logistic Plans, establishes Navy world-wide, peacetime, and mobilization reserve stock levels for petroleum products. Using these stock levels, the Fuel Supply Office determines the net requirements for bulk petroleum within the continental United States. Likewise, the Navy's overseas stocking points also assume the responsibility for maintaining these levels which are subject to review by the FSO. Overseas requirements are computed by each Service for its forces within the theater, and are submitted to the Joint Petroleum Office for consolidation and subsequent forwarding to the DFSC. Frequent meetings between the Services, MSTS, and DFSC are held to coordinate requirements for further procurement and distribution action.

During World War II and in subsequent years, petroleum has been singled out for specialized handling from the JCS level down through the Departments and the overseas commands. Varying degrees of direction is provided to the inventory control points from the respective military departments in computation of levels for operating stocks, mobilization reserves, and facilities. Each Service has problems peculiar to its assigned mission. The essentiality of petroleum is absolute with little opportunity for substitution. Therefore, having the right products at the right place and at the right time deserves the utmost attention.

The matter of realistic, valid POL consumption factors for computing peacetime and mobilization reserve stocks and routing operational requirements for bulk petroleum products is worthy of mention. POL consumption factors applicable to U. S. Naval vessels operating under wartime conditions are prepared by the Bureau of Ships. These fuel rates, either underway or not underway, are based on an assumed speed, or for an average speed during a period of data for each type or class of vessel. Then

with a model of the "forces" listing each vessel by type, these fuel rates can be applied to compute the estimated consumption. A similar system is utilized for the computation of aviation fuel requirements. It is not intended to imply that this system will not produce satisfactory results. However, from experience, this writer has found that although the rates may be reasonably accurate for the steaming speeds on which they are based (WW II), there are other factors that directly affect fuel consumption estimates; i.e., type of operations in which engaged, length of operations, whether ships are operating with a carrier task force or independent, and even seasonal conditions (typhoons) affect both flying and ship operation. Also, the tables do not include complete consumption data for all ship-classes; the latest additions to the fleet have not been added. This is certainly an area that deserves consideration of other possible or revised means of estimating requirements--a project within itself.

Procurement.

The determination of requirements; i.e., what is needed, where it is needed, and when it is needed, forms the basis for all procurement action. This tremendous responsibility, which includes world-wide procurement of petroleum products for all three Services, is a primary function of the DFSC. Without question, it is big business. In Fiscal Year 1963, total dollar procurement was nearly $1.2 billion. Of this amount, 89.9 percent was competitive.[26] At the end of January 1964, total dollar procurements

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[26]Defense Fuel Supply Center, Command Review, 2 March 1964, p. 30.

were running at a rate slightly ahead of the same period for 1963 and competitive procurement was up 2.3 percent.[27]

Majority of petroleum products purchased in the continental U. S. and Caribbean areas are negotiated. Contracts, as a general rule, are 6 months in duration and are of the "open-end" type, obligating the Government to take only that quantity which it specifically orders. On this type contract, no funds are cited. Small business participation in procurement over the past few years has fluctuated mildly. In general, participation has remained in the vicinity of 20 to 23 percent of the total U. S. procurement for products and services.

In determining the combination of awards which will result in the lowest over-all cost to the Government, many calculations must be made. For jet fuel (JP-4) this is a matter of matching bids from over 200 sources with requirements for over 300 destinations and applying over 2500 different transportation rates. It is in effect a sequential selection procedure that must consider successively each of the many combinations which are reasonably feasible. DFSC has applied linear programming using electronic data processing techniques to reduce procurement lead time and to evaluate bids.[28]

Funding. Bulk Navy procurements are initially funded by means of the Navy Stock Fund (NSF). The Bureau of Supplies and Accounts administers the NSF for products purchased under its inventory control. The typical funding cycle for a revolving fund prevails; i.e., the NSF finances procurement of items identified as Navy Stock Account material and then

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[27] Ibid., p. 30.

[28] Petroleum Management, op. cit., p. 6.

the NSF is reimbursed when the final charge is made to the appropriation for end use expenditure. Just as the Navy budgets for procurement of bulk petroleum, the other military departments likewise, but independently, perform this function.

Distribution.

Each military service has its own petroleum distribution system (modified). As mentioned earlier, DFSC has full authority and responsibility to select sources of product and means of transportation to meet resupply requirements involving tanker and tanker/barge combination movements to bulk terminals world-wide. Coordination between the Services and DFSC plays a significant role in petroleum distribution.

Continental United States. Within the continental United States, the basic distribution pattern for aviation fuels and other bulk fuels is to use the commercial distribution systems to the maximum extent practicable. That is, contracts are for direct delivery from industry to the consuming activity. When overland transportation is required, pipelines are used whenever possible. Many bases and stations are being serviced direct from industry by utilizing the pipeline method.[29]

Approximately 50 percent of the fuels moved from industry to military-owned or leased terminals is further distributed to continental activities and overseas destinations or issue to fleet units.[30] This is accomplished

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[29] La Motte, op. cit., p. 101.

[30] Petroleum Management, op. cit., p. 8.

through coordinated efforts of the Services and DFSC.

Overseas. Supply to overseas commands is accomplished primarily through the Joint Petroleum Offices. DFSC provides a central liaison between these offices and the military departments and is responsible for coordinating all distribution to overseas commands.[31]

Cross-servicing. In significant contrast to the situation existing in the United States is the unified commands overseas where cross-servicing and single stock ownership has been established. Each military department is responsible for cross-servicing a product world-wide. This responsibility is based upon a mutual agreement of the departments concerned. The major factor involved in determining these responsiblities is which Service has the predominate interest in each product and the facilities to handle its distribution.

Under this plan in each overseas area, each product is assigned to a single Service as its responsibility for submitting requirements for purchase to DFSC and for funding the stocks for movement into the area. The department owning the terminal activity at which the product is stored retains ownership of such facilities and continues to operate the facilities for all three Services. Maintenance and operating cost of facilities is borne by the owning Service, regardless of product ownership.

In WESTPAC for example, all Navy Special Fuel Oil and Jet Fuel (JP-5) are owned by the Navy and all Aviation Fuel 115/145 is owned by the Air Force. All fuel depots for "bunkering" and Fleet Oiler resupply in Japan are operated by the Army. Here we observe the marriage of two supposedly incompatible ideas--competition and cooperation--with all three Services working together

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[31] Ibid.

and participating in providing coordinated logistic support with uncommon ownership of stocks to serve each others' needs.

Storage. Planning for petroleum storage is undertaken within JCS to support the JCS Strategic and Logistic Plans. Such plans are general and detailed implementation takes place at the military department level and below. DFSC coordinates the storage positioning of mobilization reserve and peacetime operating stocks in accordance with DOD policies, operational needs, and with further consideration of the wartime missions of the military services.

In overseas areas, petroleum storage may be either military owned and operated or contracted for commercially. DFSC contracts on a world-wide basis for all commercial storage. Facilities contracted for are the operational responsibility of the requesting Service. Where service competition exists for available commercial storage DFSC undertakes to arbitrate the matter and then allocate storage in a manner of best interest and needs of the military establishment.

Analysis.

Having briefly looked at the basic elements of petroleum logistics and the responsibilities of the individual Services and DFSC, it has been found relative to bulk products that:

a. Computation of net requirements and funding these requirements is a responsibility of the three Services.

b. Procurement is the responsibility of DFSC.

c. Distribution is a coordinated responsibility of the three Services and DFSC.

Thus, DFSC is not a fully integrated manager. This immediately gives rise to the question, "Why not?".

In supporting its mission, the military is limited by the resources allocated to national defense. Within these resource constraints, the criterion is one of choosing among alternatives in an attempt to maximize gain. Hitch and McKean, in their book, The Economics of Defense in the Nuclear Age, list several approaches for obtaining efficiency in the military, where no price mechanisms and other natural elements for forcing efficiency are available.[32] One approach is increased recognition and awareness that military decisions, whether they involve budgetary allocations or not, are economic decisions, and that unless the right questions are asked, the appropriate alternatives selected for comparison and the criterion for choosing the most efficient utilization of resources will suffer.[33]

Relative to petroleum logistics we are seeking the most dependable, responsive, and economical system possible. For analysis purposes, one alternative available is to fully integrate DFSC. But would such a change provide additional efficiency and a better system?

Various studies of the fully integrated managers of commodities common to all Services have concluded that the significant economies are derived from the elimination of concurrent buying and selling, reduction of cross hauls and back hauls through more integrated distribution, payroll reduction, better procurement operations, more favorable prices by consolidating total defense requirements, and stimulation of item reduction. In short, avoid duplication, overlapping facilities, and achieve better management.

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[32]Charles J. Hitch and Roland N. McKean, The Economics of Defense in the Nuclear Age, (Massachusetts: Colonial Press, Inc., 1960), p. 107.

[33]Ibid.

Bulk military petroleum products include aviation fuels, jet fuels, motor gasolines, kerosenes, diesel fuels, solvents, and boiler fuels.[34] There is hardly an opportunity for item reduction except through research and development of fuels that can be substituted for or will replace another fuel. Alternatively, there is the development of propulsion equipments that will burn the same fuel; i.e., a fuel for ships, a fuel for aircraft, etc. Here, one must consider what the future holds in the way of "nuclear power". In years to come, who knows whether or not the Captain's gig might not be powered by nuclear energy?

Actually, there is little opportunity for duplication of products in the bulk petroleum area. The Navy is primarily a user of Navy Special Fuel Oil (NSFO) and JP-5 jet fuel,[35] the Air Force is a primary user of aviation fuel, grade 114/145, and JP-4 jet fuel, and the Army uses primarily diesel and motor gasoline. This is not to say that the Navy does not use diesel or other bulk products, but to emphasize that bulk usage is concentrated on several products for the three services.

To meet the operating and mobilization requirement, the DFSC and the Services jointly compare requirements and facilities. Where the requirement of one Service can be met with the capability of another Service, this is done. Adjacent facilities may exist, but overlapping facilities should not occur.

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[34] Certain grades of lube oil are also distributed in bulk.

[35] JP-5 is a special "high flash" kerosene. It was developed specifically for safe storage in CV tanks. BuShips has authorized the issue and use of JP-5 in lieu of diesel fuel for diesel engines where improved logistics will result. (COMSERVPACINST P4020.5a, subj:Fleet Oiler Manual, pp. II-10.)

Better management under the integrated system is problematical and depends upon the basis from which approached. The integrated manager's mission is predicated upon generating operational economies. The Services argue that this is good only to the extent that it does not deny them the ability to carry out their responsibility to know and control their readiness position; and, also, that the authority for logistic support of items vital and critical to the success or failure of a military engagement must follow responsibility.

In the case of bulk petroleum, the single manager concept has certainly proven its management ability in the area of procurement. DFSC consolidates requirements from the three Services for procurement purposes. The economics and effectiveness of petroleum procurement under the single manager concept is supported by the statements of the DOD Review Panel (Commodity Single Manager Evaluation Study) after three years of operations. This study indicated that the petroleum supply system of the DOD, which embraces the operations of the Single Manager as well as the service supply systems, provides a high degree of supply effectiveness. Customer satisfaction is high; and the coordinated procurement of this vital commodity, petroleum, is handled in a manner satisfactory to all of the Military Services.[36] This study was undertaken by the DOD, involving the Joint Staff of JCS, to determine whether single managers had proved to be effective and economical in peacetime; and, also, whether they possessed the requisite mobilization readiness and wartime capabilities.

This brings up the point of what type of war we are preparing to support.

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[36]United States Congress, House of Representatives, Committee on Government Operations, Military Supply Management, Hearings before Subcommittee, 86th Congress, Second Session, April 25, 26, 1960, (Washington: Government Printing Office, 1960), pp. 99-111.

Hitch and McKean discuss three possible types of war: (1) all-out thermonuclear war, (2) limited or local wars, and (3) large-scale or long wars such as World War II.[37] They conclude that the latter is the least likely to occur; and that the relative probabilities of types 1 and 2 occurring will depend in part on the policies that the United States pursues. Further, that preparation to deal with only one type invites defeat by another.

The current petroleum organization, like other single managed commodities, has not undergone the true test of readiness required in escalated Koreas or a major war effort. It has responded, however, in recent crises in Laos, Vietnam, and Cuba in meeting tremendous increases in demand for bulk petroleum. There is no evidence to support a finding that it would be less dependable or respond otherwise in wars involving larger and world-wide petroleum demands.

Finally, are further economics possible in a fully integrated petroleum logistic system without affecting the present dependability and responsiveness of the system? Integration would include additional responsibilities such as: (1) inventory control to include computation of net bulk requirements, (2) funding and ownership of wholesale bulk stocks, and (3) direct control of the whole distribution system.

Even if these responsibilities were taken from the Services and centralized on one office, there would still be a significant amount of coordination to be accomplished--coordination as practiced in the present system. Planned requirements, exercise requirements, location changes for aircraft squadrons, ship concentration information, etc., must be fed to the manager. Presently, DFSC deals with the inventory control point as the representative of each Service. If the inventory control point were

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[37] Hitch, op. cit., pp. 11-14.

eliminated, DFSC would deal with many offices within the departments. There would be no one office to coordinate the bulk petroleum plans and programs of the individual Services unless another office were established or this function absorbed in the current organization. If another office were established or the function absorbed in the current organization, it would require personnel. At the same time, more personnel would probably be needed in DFSC to accomplish some of the functions being performed by the inventory control points. As a matter of information, there have been no personnel savings since the creation of MPSA because no offices were consolidated; consequently, there has been an increase of some 250 people including about 20 officers from the three Services.[38]

Presently, DFSC appears to have direct control of the major part of petroleum distribution. Approximately 50 percent is moved from industry to military or leased terminals for further distribution to continental activities, overseas destinations, and for issue to fleet units. DFSC controls the tanker movements to overseas areas as well as tanker/barge movements in the United States. When the tanker/barge quantity of re-distribution plus the issues to fleet units are considered, the quantity remaining does not seem so significant--particularly for the Navy.

Although the Services fund and own the wholesale bulk petroleum stock, does this really cause additional expense? Supporters of the argument for central control of the moneys argue that it gives the manager the authority for decision concerning "when to buy" and that procurement costs can be decreased under the Economic Order Quantity. Most contracts for bulk product are "open end" type for 6 months duration and longer. Funds are

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[38] Military Supply Management, op. cit., p. 30.

not cited until an order is placed. Requirements during normal operations are relatively steady (high volume, low variance). During a crisis requirements change constantly and drastically. Before procurement can be effected for a large quantity of bulk petroleum, there must be adequate expected storage at time of delivery. Stock turnover must be within specified intervals or the product may become unfit for its intended use. Inventories are measured in days of supply. Even though back-up stocks are in the petroleum industries' refineries and terminals, the industries are faced with practical limitation on their inventories which average only about 60 days.[39] It appears there are many limitations other than funding in the petroleum area to govern "when to buy" and "how much to buy".

[39] Petroleum Management, op. cit., p. 3.

CHAPTER IV

CONCLUSIONS AND RECOMENDATIONS

Conclusions.

Nearly half a century has elapsed since the Navy was initially faced with the problem of assured fuel oil supply and its related distribution. Propulsion equipment has advanced from coal burning to oil, and now the prospect of increased utilization of fissionable energy. Realistically, extensive use of the latter is not in the near future. Therefore, the petroleum logistic system must meet the fuel demands of the present-day military operations, which hinge almost entirely on the use of petroleum-consuming machines.

The bulk petroleum logistic system is dependable and responsive. It provides the bulk products when they are needed, where they are needed, and in the quantities required. There is no evidence to support a conclusion that the system would react differently in possible future crises, including local and limited wars or a long war of the World War II type. No matter what type of system we have, response in the event of an all-out nuclear war will depend on support facilities remaining (after attack) and the Petroleum Industries' ability to provide product that may be required--not on a modified centralized versus decentralized system.

The criterion that must be satisfied is one of economy without sacrificing readiness. Whether in peace or war, the allocation of resources must be utilized to the fullest advantage. The less resources required for logistic support, the more resources become available for other means vital to national defense and the civilian economy.

It appears in bulk petroleum logistics that the modified single manager concept is providing significant savings in the procurement and distribution

area. Whether additional economies are possible in a fully integrated system is problematical. For an item so vital to the success or failure of a military engagement there must be special coordination of that item within the military departments. (We have seen how product usage concentrates in one Service.) The current inventory control points provide this function.

The number of bulk items is few; but the dollar expenditure is enormous. This fact coupled with their vital nature and lack of opportunity for substitution makes close item review most desirable. Whether this is done by DFSC or the individual Service, it requires personnel. Since the majority of contracts for bulk petroleum are of the open end type, with no funds cited, there appears to be no significant advantage to be gained by central funding. DFSC controls all tanker/barge distribution world-wide, which together with shipments direct from industry to consumer via pipeline, rail, etc., accounts for the majority of all distribution.

Generalities such as duplication of stock at one or more sources, procurement of items already in long supply or held by another Service, cross hauling, back hauling, etc., are easy to charge and in some rare cases easy to prove. But would a centralized system be a panacea to the problem? Hitch and McKean point out that "Unfortunately the superficial illogicalities of decentralization are more strikingly obvious than the deadening consequences of extreme centralization."[40] They further indicate that the bureaucratic regulations and the paper work needed to prevent such occurrences, as stated above, would undoubtedly be far more costly and far more damaging to efficiency than any conceivable gains.

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[40]Hitch and McKean, op. cit., p. 238.

Under the present Defense Logistic Service Center procedures, the Military Services have the prerogative through item management coding of retaining those items which they consider essential to weapons systems, even though the item class is centrally managed. Certainly bulk petroleum products would be considered in the "essential" category.

Initially, when this paper was begun, it was felt that DFSC should be given full authority in the area of petroleum logistics--a fully integrated system. However, after research and study of materials available, this writer concludes that the significant economies to be gained in the bulk petroleum logistic system are being reaped from the current organization.

Recommendations.

It is recommended that no further integration of functions be effected in the bulk petroleum logistic system at this time.

The following areas are recommended for further research:

a. Naval Petroleum and Oil Shale Reserves. This is certainly an area for research in determination of whether or not the Navy needs control of the reserves today or should they be turned over to private industry. Here one must consider the political implications.

b. Bulk Petroleum Consumption Factors. The entire area of the method of computing consumption factors for ships and aircraft should be carefully studied to determine the most valid means of computation.

c. Economics of Ownership and Operation of Bulk Petroleum Storage. This study would include an analysis of the present cost factors involved in (1) Government ownership and operation of storage, (2) Government ownership and contract operation of storage, and (3) Contract ownership and operation of storage.

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